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Bathed in ultraviolet light, human bodies hang by thin wires, spir- ator tubes connected at the neck, food tubes leading in, waste ubes leading out. Thus in vivid living color, the movie *Coma* brough into movie houses and, through TV promotions, into homes, many f the crucial issues surrounding human death which were once h dden behind the doors of hospital intensive care units.

On the surface, the movie simply followed one medical stu ent's suspenseful investigation into the unexplained deaths of a num er of healthy young hospital patients. At the exciting climax, after un overing a sinister enterprise which preserved living cadavers for inter- national marketing in organ transplants, she found herself on the way to becoming the newest victim. But within this simple story line, this movie and the book upon which it is based shockingly confront the audience with many complex questions. What is death? When does it occur: at an instant or through a long process? What criteria should be used to determine that the fact of death has occurred? What limits are there to what can be done to a human body once it is declared dead? To whom can one turn for authoritative answers: theologians? philos- ophers? psychologists? anthropologists? lawyers? physicians? Thus the present realities and future possibilities so vividly dramatized in *Coma* raise the need to re-examine the moral and ethical consequences of the legal and medical efforts to reformulate the definition of death.

At the present time, 18 states have enacted new statutes which include brain death criteria for determining that death has occurred. The remaining 32 legislatures are, or soon will be, heatedly debating this issue with a sense of urgency tempered by confusion and frustra- tion. Surprisingly, before the 1960's, there was no statute law defining death. Courts simply used the traditional common law definition involving cessation of respiration and circulation as observed by a licensed physician.

The advent of organ transplants raised the demand for a new and more precise definition of death. Physicians now asked at what point in time did the dying, medically suitable donor become ethically and legally a proper candidate for removal of organs? At the same time, other transplant cases focused attention on the legal question of pre- cisely who is the cause or direct contributor to the death. Specifically, defense attorneys asked, in the case of a fight or automobile accident, whether the direct cause of death was the aggressor or driver who struck the fatal blow or was it the physician who turned off the respirator or removed the still beating heart?

In 1968, in response to these questions, an ad hoc committee of Harvard Medical School formulated a widely used set of criteria for brain death. Briefly, these criteria involve three distinct steps: 1) a precondition which eliminates the presence of barbiturates, or hypo- thermia (lowered body temperature), which can simulate symptoms of brain death; 2) specific tests to determine the absence of responses, reflexes, and spontaneous movements including spontaneous efforts at breathing; and 3) a confirmation by two flat electroencephalograms taken 24 hours apart.

It is important to note here two points that are widely misunder- stood. These criteria are applicable only when the cause of the sus- pected brain death is known, such as with a history of metastatic cancer or physical trauma. Secondly, the flat EEG is not itself a test for brain death but rather a confirmation valid only at the conclusion of other tests. Persons who were quite alive have produced false, nega- tive (flat) EEG's due to malfunctions of equipment used. On the other hand, positive EEG's have been obtained from non-human subjects such as a bowl of Jello.

Existing Statutes

In 1970, Kansas was the first state to enact a statutory definition of death. The statute allowed the physician to use either the traditional criteria of cessation of respiration and circulation or to use the option of the criterion of absence of spontaneous brain function. Many physi- cians saw this as a first, enlightened, and intelligent step in the direc- tion of legally recognizing brain death. Others, however, criticized its length (200 words) and its awkward string of "and's" and "or's." But much more serious was the objection that this statute provided not one, but two alternate definitions. This fact raised fears that physi- cians could now freely and arbitrarily manipulate the "time of death" for organ donors, survivorships, and inheritances by choosing one or the other definition.

By 1977, Michigan, West Virginia, Louisiana, Iowa, and Montana had enacted a briefer (100 words) and less ambiguous definition. This

law uses the traditional heart-lung criteria with the specific exception that when artificial means (such as a respirator) preclude the use of the traditional criteria, the physician may then pronounce death in the presence of "total and irreversible cessation of spontaneous brain functions."

In 1974, after a lengthy series of studies, including the conscientious work of Dr. McCarthy DeMere who is both a physician and a lawyer, the American Bar Association had proposed what it considered to be a model for such legislation:

> For all legal purposes, a human body with irreversible cessation of total brain function according to usual and customary standards of medical practice, shall be considered dead.

Many legislators were attracted by the clear and concise wording. Moreover, it seemed to avoid potential philosophical and theological disputes about the meaning of such intangible concepts as soul person, or being. It simply presented a medical and juridical determination of fact rather than a definition of death itself. As a result, many physicians and hospital administrators lent their support to this wording, including many Catholic associations and individuals. To date, at least four states have based their statutes on this model and its use is pending in still others.

Ethicists, however, quickly pointed out several major ambiguities implied in this law. In their effort to avoid using the words "human being" or "person," the proponents of this law declared the "body" to be legally dead. In all fairness, the intention of the law was obviously to declare the human legal person dead even while the body maintained the appearance of life. However, the observation and judgment of the ordinary, reasonable person perceives the body of a brain-dead person — warm, pulsating, and breathing — as very much alive in spite of any legislative *fiat* to the contrary.

A second and even stronger objection is made against the use of the words "irreversible cessation of total brain function." These words are ambiguous. Does "total brain function" cease when only one part of brain function ceases so that the brain function is no longer total? Or does "total" mean that *all* brain functions have ceased? Under the first interpretation, a person who suffered a stroke, even a small one, might suffer some loss of brain function and thus would not have "total" brain function. In this interpretation of the ABA model law, any such stroke victim could be declared legally dead. To take another example, insofar as the optic nerves are anatomically part of the brain itself, anyone with damage to his retina or optic nerves, even in one eye, would have "cessation of total brain function." If this damage were permanent and irreversible, it would render the otherwise healthy and functioning one-eyed person legally dead.

Obviously, there is a second and equally valid interpretation of the words "irreversible cessation of total brain function." This refers to the situation in which all brain functions have ceased. Indeed, when challenged by those who express fears of the first interpretation, physicians point out that the first interpretation could never be used because of the protection contained in the clause "according to customary standards of medical practice." Critics, however, continue to press the fact that the citizens have a right to a good law, a law whose wording is exact and unambiguous. For example, a revised proposal before the Missouri legislature uses the words "human death" instead of "body" and the criterion "total and irreversible cessation of all brain function." These small changes clearly avoid the two objections made above. In any event, more accurate and better worded legislation will save taxpayers the time and expense of court cases trying to explicate the otherwise hidden intentions of the legislators.

Reasons for the Legislation

In October, 1977, Frank J. Veith, M.D., and a group working with him, published what is to date the most comprehensive survey of scientific, legal, and moral aspects of this issue (*JAMA*, Oct. 10 and 17, 1977). These authors felt they had clearly established the scientific validity of current clinical criteria for determining brain death. Moreover, they found such criteria to be in accord with secular philosophy and the three major Western religions. From the Catholic tradition, the Veith group noted favoring opinions by Connery, Haring, and McFadden and cited the 1957 statement of Pope Pius XII which declared the practical clinical determination of the actual separation of body and soul to be beyond the competency of the Church.

The Veith position is very weak since it quotes only three experts in medical ethics and depends too much upon an artificial Church statement which itself needs further clarification. Moreover, Veith overlooked one very important ethical question involved in the legislative enactment of such a definition. Simply stated, there remains the crucial question as to whether, in its effort to respond to specific current problems, such legislation is in fact "too much law," which unwittingly but certainly opens possibilities for dehumanization unforeseen by its benevolent backers.

There are two main reasons why physicians and hospital administrators press so strongly for such legislation. First is the desire to gain immunity from criminal and civil prosecution for hospitals and their physicians who, in good faith and after consulting with the family, cease using heroic and useless means in the extremes of hopeless terminal illness. The second reason is the desire to increase the success rate of kidney transplants.

Ordinary and Extraordinary Means

There is no secret that in most hospitals and not infrequently p y-sicians do turn off respirators, stop antibiotics, or otherwise arrang to allow hopelessly terminal patients to die. In any meaningful sens of the word, this is a "usual and customary standard of medical p ac-tice." Moreover, this writer's research has uncovered no case whe a physician has been successfully prosecuted for *allowing* a patien to die in such extreme circumstances. But even if the physician's fear are to date unwarranted, they are nonetheless real. Legal authorities p int out that without a legal definition of brain death, any physician ho turns off the respirator of a patient who then dies and is afterw rds pronounced dead under the traditional criteria might actually be on-sidered the cause or direct contributor to that patient's death. O the other hand, with the protection of a legal brain definition of d th, the physician may pronounce the patient dead before cessatio of heartbeat and respiration and after pronouncing the patient le ally dead, may then go ahead and stop the respirator without bei g a contributor to that patient's death.

In all fairness, however remote the possibility of criminal pro cu-tion, physicians have the right to some protection in cases of the sort just mentioned. Moreover, one cannot deny the fact that in the cur-rent wave of malpractice lawsuits, many good and conscientious p ysi-cians are being sued for wrongful death or negligence in inst nces where in good conscience they have merely ceased using extraord nary means. Except for cases of proven negligence outside the standar ls of good medical practice, these suits are rarely successful or are se tled out of court. Nonetheless, physicians who are defendants in such suits always suffer the loss of their attorney's fees or increased insu ance premiums together with great emotional stress and public emb rras-ment. Even admitting that physicians who discontinue extraord nary means have the right to protection from groundless lawsuits, the cen-tral moral question remains whether a legal definition of death in its scope, power, uncertainties and potential dangers, is the best, or indeed the only way to insure this protection. Could not more simple and specific legislation be constructed which would straightforwardly grant immunity from civil and criminal prosecution to physicians who withdraw the use of extraordinary means according to "usual and customary standards of medical practice"?

One significant factor adding to the legislator's frustration in formu-lating a satisfactory law is the difficulty in fully appreciating the rad-ical difference between the MEDICAL understanding of ordinary and extraordinary means and the MORAL understanding of these terms. Medical personnel commonly speak of medications and treatments in terms such as conservative or aggressive, standard or experimental, ordinary or heroic. Exactly which procedures fall into which category

depends very much upon such factors as whether the hospital is in the country or in a metropolitan research center, whether it is a private or a teaching hospital and, most often, upon the reigning philosophy of the senior medical staff.

The moral understanding of ordinary means includes only those means which offer a reasonable hope of benefit to the patient, are reasonably accessible, and involve reasonable costs and pain, either physical or psychological. Any means which, in fact, do not offer reasonable hope of benefit to the patient, which are not reasonably accessible or which involve unreasonable costs or physical or psycho-logical pain are, in the MORAL sense, extraordinary.

With the explosion of medical technology and federally financed allocation of resources, even small rural hospitals can now readily provide treatments which, in the medical sense, thus become conserva-tive, standard, and ordinary. However, many of these remain morally extraordinary in terms of cost, pain, or inability to offer reasonable hope of benefit.

As an example, in some medical centers, a hemipelvectomy is con-sidered a standard, non-experimental procedure. This involves, after amputating a foot and then a knee in efforts to stop the spread of bone cancer, amputating the pelvic bones. The patient is literally cut in half leaving nothing below the navel except drainage tubes for solid wastes and urine. With special funding available, several hemipelvec-tomies can be done each month and can be offered without cost to residents of that state. These facts might render a hemipelvectomy medically ordinary, but in view of the physical and psychological pain and questionable prognosis, for some patients, this is obviously an extraordinary procedure in any moral sense of the word. Similar con-siderations could be applied to many other so-called ordinary hospital practices. Thus, because they cannot distinguish between what is med-ically ordinary and what is morally obligatory, some physicians and institutions seek refuge in the shadow of the dangerous umbrella of brain death legislation.

Organ Transplants

At first glance it would seem that no one could object to the second reason offered for legalizing brain death, that is to increase the success rate of kidney transplants. Indeed, the same technology which is designing the totally implantable artificial heart offers hope that one day all the moral difficulties surrounding organ transplants will be of historical interest only. But for the present, organ transplants remain the only hope for many victims of end-stage renal disease. Especially in the case of kidney transplants, since the function of the organ is so delicate, its usefulness in the recipient is greatly increased if it is removed before the donor's circulation has stopped. However, grant-

ing that any increased success for transplant recipients is an obviou ly good and essentially humanizing motive, there still remain several c u- cial moral considerations.

At its core, the issue of organ transplants is totally different fr m the question of turning off the respirator. The transplant proced re itself involves an active intervention on the part of the surgeon wh ch of itself may or may not be the cause of the donor's death depen ng upon whether or not that donor is truly dead as a human perso In the case where the physician turns off the respirator, it is the dis ase which is the cause of the patient's death, not the physician's inter en- tion. Here it is not a question of whether or not the patient is d ad but rather a question of whether the respirator is a morally extrao din- ary and unnecessary means of caring for a critically terminal pat nt. But for the living transplant donor, the critical question is prec ely whether irreversible cessation of all brain functions is the sam as brain death and whether brain death is the same as human death.

The major objection against legalizing brain death criteria so hat "living cadavers" can be used for more successful transplants a ises from the traditional principle of moral conservatism. This prin iple applies especially in such crucial questions as those concerned with human life and death. According to this principle, in cases of dou bt it is morally wrong not to err in the direction of life. It is thus wro g to say, "Since the patient is not certainly alive, we will consider him dead." So long as there is a real possibility that a person is alive, h e or she must be treated as alive. However, some transplant surgeons hal- lenge, "Which life is more at risk, that of the donor who is pres med dead or that of the recipient who is seriously ill but obviously alive and salvagable?" In rebuttal, the opponents of brain death legisl ation point out that in weighing the probabilities and risks, it is *certai* that the donor will die according to any definition when his kidneys are removed, while it is only *probable* that the recipient will benef t sig- nificantly from the transplant.

Again there is no question that patients with chronic kidney disease would enjoy longer life expectancy with legal brain definition of death. Moreover, a nation-wide (and even international) standard for deter- mining human death is desirable since any citizen of any state should have equal access to the benefits of ethical medical progress. But the question remains, whether or not an umbrella-like legal definition with its potentials for foreseen and unforeseen abuses is the best or the only way to protect the rights of all patients.

Frightening Prospects

Some very frightening prospects may lie ahead. The medical liter- ature already presents quite serious proposals for medical centers to maintain banks of "living cadavers" as ever-ready sources of blood, insulin, and other hormones. With such cadavers, researchers could quickly cultivate human antibodies to combat new diseases, test new drugs and conduct much more efficient experiments for the benefit of living human beings. Other proposals emphasize the advantages of the more realistic and, therefore better, educational value of living cadavers for students of anatomy, physiology, pharmacology, and sur- gery. Together with these possibilities come still more ethical ques- tions concerning the buying, selling, and trading of such cadavers as has already happened with regard to aborted fetuses in Britain. (See "Harvesting the Dead," by Willard Baylin, M.D. in *Harpers*, Septem- ber, 1974.)

One can imagine that at some time in the future our developing understanding of the meaning of "human' and consequently our devel- oping sense of what is dehumanizing and immoral might grow to the point where such procedures as those described above would become acceptable At one time such common and beneficial procedures as blood banking, autopsies, and medical school dissections were con- sidered inhuman, shocking, scandalous, and morally questionable. Nonetheless, the potentials for dehumanization inherent in any legal definition of brain death demand that safeguards be built into this legislation itself.

In conclusion, the crucial question yet to be answered is how to prevent the real and potential abuses described above. Can broad and sweeping brain death definitions which rely upon the "customary standards of medical practice" and special interpretations for individ- ual cases avoid these dangers? Or would not more limited, explicit, and straightforward legislation better protect both the rights of phy- sicians and health care institutions as well as the rights of patients?

For the most part, the scenes vividly presented in the movie *Coma* are fiction. But they are fiction based upon current facts and feasibil- ities as the bibliography at the end of Dr. Robin Cook's original book clearly indicates. These scenes strongly suggest that only a rigorous and conscientious examination of the moral as well as the medical implications of legal brain death can prevent such fiction from becom- ing reality. As one state legislator reflected, "Deciding to approve or reject a legal brain definition of death is really quite different from deciding the color of next year's license plates."
